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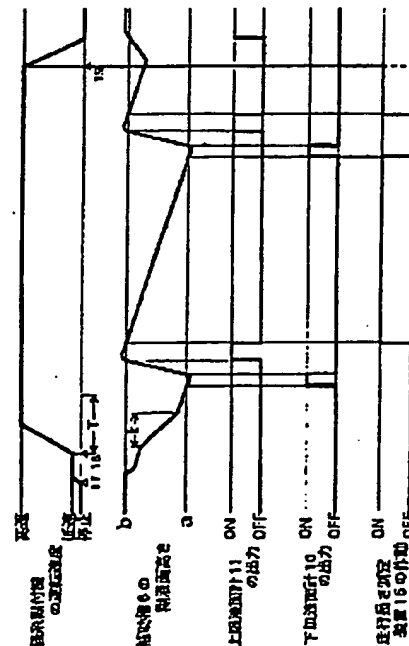
(71)出願人 000124672
河本製機株式会社
愛知県名古屋市区代官町40番21号
(71)出願人 391038464
一見 輝彦
大阪府大阪市東淀川区東淀路1-5-2-812
(72)発明者 伊達 和雄
愛知県春日井市天神町1番地 河本製機株式会社春日井工場内
(72)発明者 浅井 忍
愛知県春日井市天神町1番地 河本製機株式会社春日井工場内
(74)代理人 弁護士 水野 桂

(54)【発明の名称】 経糸糊付機における糊付若率の測定方法

(57)【要約】

【目的】 過渡状態又は誤動作による大きな誤差を有する測定値を表示しない。

【構成】 補助槽6の糊液面が測定区域の始点bから終点aに移動する間に経糸が走行する長さを測定し、その長さと、その間に補助槽から減少する糊液量に基づいて糊付若率を計算する。経糸糊付機が所定の運転速度になって補助槽6の糊液面の移動速度が過渡状態を通過した後で、経糸糊付機が所定の運転速度から減速し始める前に、補助槽6の糊液面が測定区域の始点bから終点aに移動するときのみ糊付若率の測定値を出力する。また、糊付若率の測定値が糊液濃度の半分より大きくて2倍より小さいときにのみその測定値を出力する。



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【特許請求の範囲】

【請求項1】 主槽の糊液を経系に付着し、主槽の糊液が経系に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経系糊付機において、

補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、

補助槽の糊液面が測定区域の始点から終点に移動する間に経系が走行する長さを測定し、経系の走行長さの測定値と上記の予め求めた糊液量に基づいて経系の糊付着率を計算する糊付着率の測定方法であって、

経系糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後で、経系糊付機が所定の運転速度から減速し始める前に、補助槽の糊液面が測定区域の始点から終点に移動するときのみ経系の糊付着率の測定値を出力することを特徴とする糊付着率の測定方法。

【請求項2】 主槽の糊液を経系に付着し、主槽の糊液が経系に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経系糊付機において、

補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、

補助槽の糊液面が測定区域の始点から終点に移動する間に経系が走行する長さを測定し、経系の走行長さの測定値と上記の予め求めた糊液量に基づいて経系の糊付着率を計算する糊付着率の測定方法であって、

経系の糊付着率の測定値が糊液濃度の半分より大きくて2倍より小さいときにのみその測定値を出力することを特徴とする糊付着率の測定方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、経系糊付機において経系の糊付着率を測定する方法に関する。

【0002】

【従来の技術】 経系糊付機は、糊液の主槽に糊付けローラと糊紋りローラを設け、主槽の糊液を経系に付着する構成にし、主槽に形成した越流部から流出する糊液が流入する補助槽を設け、補助槽の糊液を主槽に供給するポンプ付の供給通路を設け、主槽の糊液が経系に付着して持ち去られるに従って、補助槽の糊液面が下降する構成にしている。

【0003】 また、補助槽の糊液面が所定の下限位置に下降すると出力する下限液面計と、補助槽の糊液面が所

定の上限位置に上昇すると出力する上限液面計を設け、下限液面計が出力してから上限液面計が出力するまで補助槽に糊液を補給する構成にしている。

【0004】 経系の糊付着率計は、補助槽に糊液が補給される毎に、上限液面計が出力してから下限液面計が出力するまでに経系が走行した長さを測定し、予め求めた補助槽の上限位置と下限位置間の糊液量と経系の走行長さの測定値に基づいて経系の糊付着率を計算して出力する。

【0005】

【発明が解決しようとする課題】 ところが、経系糊付機は、運転を開始すると、糊付けローラと糊紋りローラが回転し始め、主槽の糊液に半没した糊付けローラと糊紋りローラの各周面に糊液が巻き上げられて付着し、主槽の糊液が糊付けローラと糊紋りローラに持ち去られて補助槽の糊液面が急激に下降する。また、経系糊付機の運転を停止すると、糊付けローラと糊紋りローラの各回転速度が減速し始め、糊付けローラと糊紋りローラの各周面に巻き上げられていた糊液が主槽に流入して補助槽の糊液面が急激に上昇する。従って、経系糊付機の運転開始直後と運転停止時の過渡状態のときに測定した経系の糊付着率は、大きな誤差を有る。

【0006】 また、経系糊付機の運転中に補助槽の糊液面に波や泡が発生する等して上限液面計や下限液面計が不意に誤動作することがある。このような誤動作時に測定した経系の糊付着率は、大きな誤差を有る。

【0007】 大きな誤差を有する経系の糊付着率の測定値即ち所定の値から大きくずれた測定値が表示されると、その測定値が大きな誤差を有することを知らない運転者は、経系の糊付着率を所定の値にしようとして、経系糊付機を調整する。その結果、経系の実際の糊付着率が所定の値から大きくずれることになる。

【0008】 本発明の目的は、上記のような従来の課題を解決することである。

【0009】

【課題を解決するための手段】 本発明は、主槽の糊液を経系に付着し、主槽の糊液が経系に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経系糊付機において、補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、補助槽の糊液面が測定区域の始点から終点に移動する間に経系が走行する長さを測定し、経系の走行長さの測定値と上記の予め求めた糊液量に基づいて経系の糊付着率を計算する糊付着率の測定方法であって、経系糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後で、経系糊付機が所定の運転速度から減速し始める前

に、補助槽の糊液面が測定区域の始点から終点に移動するときのみ経糸の糊付着率の測定値を出力することを特徴とする糊付着率の測定方法である。

【0010】また、上記の経糸糊付機において、補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、補助槽の糊液面が測定区域の始点から終点に移動する間に経糸が走行する長さを測定し、経糸の走行長さの測定値と上記の予め求めた糊液量に基づいて経糸の糊付着率を計算する糊付着率の測定方法であって、経糸の糊付着率の測定値が糊液濃度の半分より大きくて2倍より小さいときにのみその測定値を出力することを特徴とする糊付着率の測定方法である。

【0011】

【作用】本発明においては、経糸糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後でなければ、経糸の糊付着率の測定値が出力されない。経糸糊付機が所定の運転速度から減速し始める前でなければ、経糸の糊付着率の測定値が出力されない。

【0012】また、経糸の糊付着率の測定値が糊液濃度の半分より大きくて2倍より小さくなければ、その測定値が出力されない。

【0013】経糸の糊付着率の定義式

糊付着率＝糊重量／糸重量

の右辺に「糊液重量」を掛けて「糊液重量」で割ると、

$$\text{糊付着率} = (\text{糊液重量} / \text{糸重量}) \times (\text{糊重量} / \text{糊液重量})$$

となる。糊液重量／糸重量は絞り率であり、糊重量／糊液重量は糊濃度であるので、上記の式は、

糊付着率＝絞り率×糊濃度

となる。

【0014】糊濃度は、通常、経糸の糊付け中ほとんど変化しない。絞り率は、一般の経糸糊付機では、0.7～1.3の範囲内である。従って、経糸の糊付着率は、一般に、糊濃度の0.7～1.3倍の範囲内である。経糸の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の2倍以上であるときは、その測定値は、誤動作による大きな誤差を有している。

【0015】

【発明の効果】本発明においては、経糸糊付機の運転開始直後と運転停止時の過渡状態のときには、経糸の糊付着率の測定値が出力されないで、過渡状態による大きな誤差を有する測定値が表示されない。

【0016】また、経糸の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の2倍以上であるときは、経糸の糊付着率の測定値が出力されないで、誤動作による大きな誤差を有する測定値が表示されない。

【0017】従って、大きな誤差を有する測定値が表示

されないで、運転者が誤って経糸糊付機を調整することが防止される。

【0018】

【実施例】本例の糊付着率の測定方法を実施する経糸糊付機は、ヒームクリール部、糊付部、乾燥部、分割部と巻取部を順次配列して構成している。

【0019】糊付部は、図1に示すように、糊液の主槽1を設け、主槽1に、案内ローラ2と、糊液sに半没する糊付けローラ3、及び、糊液sに半没するローラとその上側位置のローラを並列した糊絞りローラ4を設け、経糸yが、案内ローラ2を経て主槽1の糊付けローラ3下側位置の糊液sを通過し、糊絞りローラ4の上下のローラ間を通過して、糊付けされる構成にしている。

【0020】主槽1には、図1に示すように、その糊液面の高さを一定に保持する越流部5を設け、主槽1の越流部5の下側位置に糊液の補助槽6を設け、主槽1の越流部5から流出する糊液sを補助槽6に受け入れる通路7を設け、補助槽6の糊液sを主槽1に供給するポンプ8付の供給通路9を設け、主槽1の糊液sが経糸yに付着して持ち去られるに従って補助槽6の糊液面が下降する構成にしている。

【0021】補助槽6には、図1に示すように、その糊液面が所定の下限位置aに下降すると出力する下限液面計10と、所定の上限位置bに上昇すると出力する上限液面計11を設けている。

【0022】補助槽6の上方位置には、図1に示すように、糊液sの貯蔵槽12を設け、貯蔵槽12の糊液sを補助槽6に補給する開閉弁13付きの補給通路14を設けている。

【0023】主槽1の案内ローラ2には、図1に示すように、経糸yの走行長さを測定する走行長さ測定装置15を設けている。

【0024】また、図1に示すように、中央処理装置16を設けている。中央処理装置16の入力端には、下限液面計10と上限液面計11及び走行長さ測定装置15をそれぞれ接続し、経糸糊付機の低速運転スイッチ17、高速運転スイッチ18と運転停止スイッチ19をそれぞれ接続し、入力装置20を接続している。中央処理装置16の出力端には、補給通路14の開閉弁13を接続し、表示装置21を接続している。

【0025】下限液面計10が出力してから上限液面計11が出力するまでの間、補給通路14の開閉弁13が開放し、貯蔵槽12の糊液sが補助槽6に補給される。

【0026】詳述すると、図2に示すように、補助槽6の糊液面が下限位置aに下降して下限液面計10が出力する毎に、補給通路14の開閉弁13が開放し、補給通路14の開閉弁13上流側部分に滞留していた糊液sが補給通路14の開閉弁13下流側部分を通過して補助槽6に流入し始めた後に、補助槽6の糊液面が下降を停止して上昇を開始する。

【0027】また、図2に示すように、補助槽6の糊液面が上限位置bに上昇して上限液面計11が出力する毎に、補給通路14の開閉弁13が開鎖し、補給通路14の開閉弁13下流側部分を通過中の糊液sが補助槽6に流入して、補助槽6の糊液面が上限位置bを越えて上昇し、その後、補給通路14の開閉弁13下流側部分の糊液sが補助槽6に流入する量が経系yに付着して持ち去られる糊液sの量より少なくなると、補助槽6の糊液面が下降し始め、補助槽6の下降する糊液面が上限位置bを通過すると、上限液面計11が出力しなくなる。

【0028】本例の糊付着率の測定方法においては、図2に示すように、補助槽6の下降する糊液面が上限位置bを通過して上限液面計11が出力しなくなる毎に、走行長さ測定装置15が測定を開始し、補助槽6の糊液面が下限位置aに下降して下限液面計10が出力する毎に、走行長さ測定装置15が測定を終了する。

【0029】即ち、補助槽6の糊液面が下降する途中における上限位置bと下限位置aの範囲を経系yの糊付着率の測定区域に設定している。補助槽6の糊液面が上限位置bから下限位置aに下降する間に補助槽6から減少する糊液量は、予め求め、入力装置20から中央処理装置16に入力している。

【0030】下限液面計10が出力する毎に、中央処理装置16において、走行長さ測定装置15が測定した経系yの走行長さsと、入力装置20から予め入力した糊液量等に基づいて経系yの糊付着率を計算し、その糊付着率を表示装置21に出力して表示する。

【0031】本例の糊付着率の測定方法を実施する経系糊付機の運転を開始する場合、測定開始時間Tを入力装置20から中央処理装置16中の計時装置に入力した後、低速運転スイッチ17を作動し、その後、高速運転スイッチ18を作動する。

【0032】すると、中央処理装置16中の計時装置が作動する一方、糊付けローラ3と糊絞りローラ4が回転し始め、主槽1の糊液sに半没した糊付けローラ3と糊絞りローラ4の各周面に糊液sが巻き上げられて付着し、図2に示すように、補助槽6の糊液面が一定の期間k急激に下降する。経系糊付機の運転速度が所定の高速運転速度に達して補助槽6の糊液面の移動速度が過渡状態kを経過した後に、測定開始時間Tが経過して中央処理装置16中の計時装置が出力する。

【0033】中央処理装置16中の計時装置が出力した後に、補助槽6の下降する糊液面が測定区域の始点bから終点aを通過すると、走行長さ測定装置15が作動し、経系yの糊付着率が測定されて表示装置21に表示

される。中央処理装置16中の計時装置が出力する前には、糊付着率は、測定されず、表示されない。

【0034】経系糊付機の高速運転を停止する又は低速運転にする場合、運転停止スイッチ19又は低速運転スイッチ17を作動する。

【0035】すると、糊付けローラ3と糊絞りローラ4の各回転速度が減速し始め、各ローラ3、4の周面に巻き上げられていた糊液sが主槽1に流入して補助槽6の糊液面が急激に上昇するが、経系糊付機の高速運転中に運転停止スイッチ19又は低速運転スイッチ17が作動すると、その後、糊付着率は、測定されず、表示されない。運転停止スイッチ19又は低速運転スイッチ17が作動したときに、走行長さ測定装置15が作動中である場合は、走行長さ測定装置15は、作動を停止し、それまでに測定した走行長さを取り消す。

【0036】また、経系糊付機の高速運転中、中央処理装置16において、経系yの糊付着率が計算される毎に、その計算された測定値は、入力装置20から予め入力した糊液濃度と比較され、糊液濃度の半分より大きくて2倍より小さいときに、表示装置21に表示される。糊付着率の測定値は、糊液濃度の半分以下であるとき、又は、糊液濃度の2倍以上であるときには、表示装置21に表示されない。

【0037】本例においては、経系糊付機の高速運転開始直後と高速運転停止時の過渡状態のときには、経系の糊付着率が測定されず、過渡状態による大きな誤差を有する測定値が表示されない。

【0038】また、経系の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の2倍以上であるときは、経系の糊付着率の測定値が出力されず、誤動作による大きな誤差を有する測定値が表示されない。

【図面の簡単な説明】

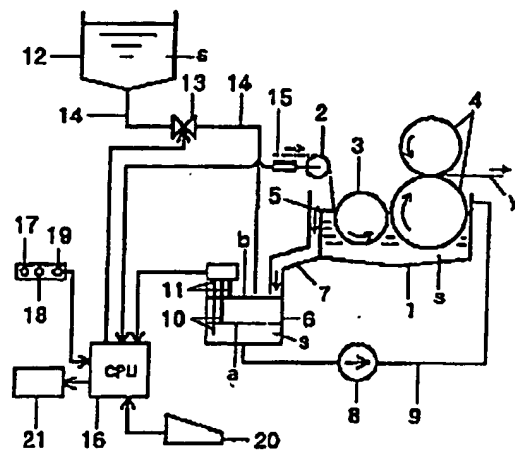
【図1】本発明の実施例の糊付着率の測定方法を実施する経系糊付機の糊付部の概略側面図である。

【図2】同例の糊付着率の測定方法における経系糊付機の運転速度、補助槽の糊液面高さ、上限液面計の出力、下限液面計の出力と、走行長さ測定装置の作動の関連と経時変化を示す線図である。

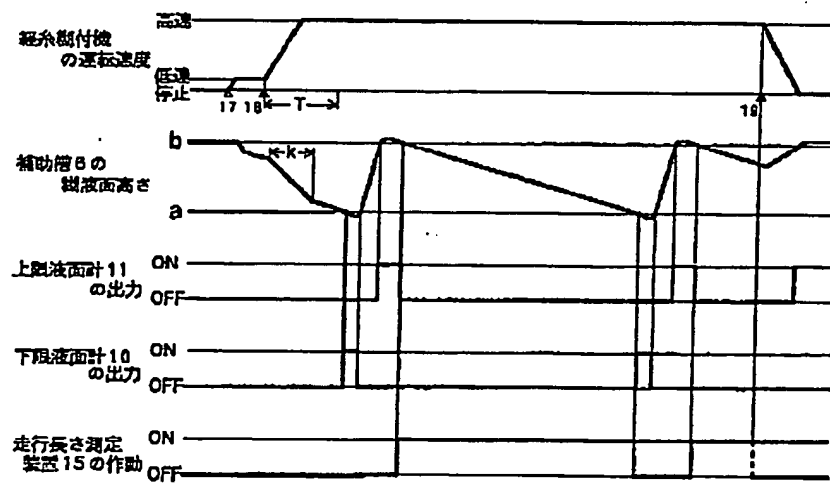
【符号の説明】

- | | |
|----------------|-----------|
| 1 主槽 | 6 補助槽 |
| 15 走行長さ測定装置 | 16 中央処理装置 |
| a 下限位置、測定区域の終点 | |
| b 上限位置、測定区域の始点 | |
| s 糊液 | y 経系 |

【図1】



【図2】



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JP-A-5-140859

[Title of the Invention] Method for Measuring Sizing Agent Adhesion Rate in Yarn Sizing Apparatus

[Abstract]

[Object] Not to display a measurement value having a non-negligible error resulted from an excessive state or malfunction.

[Structure] Yarn measurement is performed to see the length of a yarn conveyed while the surface of a sizing agent in an auxiliary sink 6 moves from a start point *b* to an end point *a* of a measurement zone. Based on the resulting length and an amount of the sizing agent in the auxiliary sink reduced in the same time period, the adhesion rate is calculated. The measurement value of the adhesion rate is output only when the surface of the sizing agent in the auxiliary sink 6 moves from the start point *b* to the end point *a* in the measurement zone. The output timing is after a yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink 6 is not in an excessive state anymore, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed. Further, only when the measurement value of the adhesion rate is larger than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement

value is output.

[Claims]

[Claim 1] A method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent,

a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an endpoint in the measurement zone is previously calculated, and

a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the endpoint in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, wherein

after the yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink is not in an excessive state any more, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, a measurement value of the adhesion rate of the yarn is output only when the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone.

(Claim 2] A method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent,

a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an endpoint in the measurement zone is previously calculated, and

a length of the yarn conveyed in a time period while the

surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, wherein

only when a measurement value of the adhesion rate of the yarn is larger than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement value is output.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention relates to a method for measuring, in an apparatus for sizing a yarn, a sizing agent adhesion rate for the yarn.

[0002]

[Prior Art] A yarn sizing apparatus is so structured that a sizing roller and a squeeze roller are provided in a main sink containing a sizing agent, and the sizing agent in the main sink adheres to the yarn. Also included are an auxiliary sink to receive the sizing agent coming from an overflow section formed in the main sink, and a supply path with a pump to convey the sizing agent in the auxiliary sink to the main sink. With such a structure, the surface of the sizing agent in the auxiliary sink falls as the sizing agent in the main sink is reduced in amount due to adhesion to the yarn.

[0003] Further, the structure also includes a surface lower limit gage which produces an output when the surface of the sizing agent in the auxiliary sink reaches down to a predetermined lower limit position, and a surface upper limit gage which produces an output when the surface of the sizing agent in the auxiliary sink reaches up to a predetermined upper limit position. Thereby, the sizing agent is kept supplied to the auxiliary sink for the duration between outputs from the surface lower limit gage and the surface upper limit gage.

[0004] A gage for a sizing agent adhesion rate of the yarn measures, every time the auxiliary sink is provided with the sizing agent, the length of the yarn conveyed in a time period between outputs of the surface lower limit gage and the surface upper limit gage. Based on both the precalculated amount of the sizing agent between the upper and lower limit positions in the auxiliary sink, and the value as a result of yarn length measurement, the sizing agent adhesion rate of the yarn is calculated for output.

[0005]

[Problems that the Invention is to Solve] The issue here is that, once the yarn sizing apparatus starts its operation, the sizing roller and the squeeze roller both start rotation. Thereby, the sizing agent in the main sink is agitated, and thus the sizing agent adheres around the sizing roller and the squeeze roller both half immersed therein. As a result, the surface

of the sizing agent in the auxiliary sink rapidly falls because the sizing agent in the main sink is reduced in amount due to adhesion to the sizing roller and the squeeze roller. Similarly, when the yarn sizing apparatus stops its operation, the sizing roller and the squeeze roller both start showing reductions in rotation speed. Thereby, the sizing agent agitated around the sizing roller and the squeeze roller starts flowing into the main sink, causing the surface of the sizing agent to rapidly rise in the auxiliary sink. Consequently, as to the sizing agent adhesion rate of the yarn, a big difference is surely caused between the one measured when the yarn sizing apparatus has just started its operation and the one measured in an excessive state during the halting of the operation.

[0006] Moreover, when the yarn sizing apparatus is in operation, wave and bubble evolution on the surface of the sizing agent in the auxiliary sink, for example, may lead to unexpected malfunction of the surface upper limit gage and the surface lower limit gage. The adhesion rate measured in malfunction results in a non-negligible error.

[0007] If the operator sees a measurement value of the sizing agent adhesion rate having a non-negligible error, i.e., a measurement value largely different from a predetermined value, without knowing that the displayed measurement value has a non-negligible error, he or she so adjusts the yarn sizing apparatus as to correct the adhesion rate to the predetermined

value. As a result, the actual adhesion rate deviates to a greater degree from the predetermined value.

[0008] An object of the present invention is to solve such conventional problems as described above.

[0009]

[Means for Solving the Problems] According to the present invention, a method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent, a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the

previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, characterized in that after the yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink is not in an excessive state any more, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, a measurement value of the adhesion rate of the yarn is output only when the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone.

[0010] Further, in a method for measuring a sizing agent adhesion rate in the above yarn sizing apparatus, a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, characterized in that only when a measurement value of the adhesion rate of the yarn is larger

than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement value is output.

[0011]

[Effect] In the present invention, no measurement value of the adhesion rate of the yarn is displayed unless the yarn sizing apparatus reaches a predetermined operation speed, and a moving speed of the surface of the sizing agent in the auxiliary sink is not in the excessive state any more. Only before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, the measurement value of the adhesion rate of the yarn is displayed.

[0012] Moreover, the measurement value of the adhesion rate of the yarn is not displayed unless the measurement result is larger than a half of the sizing agent concentration but smaller than twice the concentration.

[0013] Definition Equation of Sizing Agent Adhesion Rate of the Yarn

Adhesion Rate = Weight of Sizing/Weight of Yarn

Multiplying the right side thereof by "Weight of Sizing Agent" and then dividing by "Weight of Sizing Agent" leads to
$$\text{Adhesion Rate} = (\text{Weight of Sizing Agent} / \text{Weight of Yarn}) \times (\text{Weight of Sizing} / \text{Weight of Sizing Agent}).$$

Weight of Sizing Agent/ weight of Yarn is a squeeze rate, and Weight of Sizing/Weight of Sizing Agent is a concentration. Thus,

the above equation becomes

Adhesion Rate = Squeeze Rate X Concentration.

[0014] The concentration, usually, hardly changes during yarn sizing. With the yarn sizing apparatus of a general type, the squeeze rate is within the range between 0.7 to 1.3. Accordingly, generally, the adhesion rate of the yarn is within a value range of 0.7 to 1.3 times the concentration. When the measurement value of the adhesion rate of the yarn is a half of the concentration of the sizing agent or smaller, or twice or more thereof, it means that the measurement value has a non-negligible error due to malfunction.

[0015]

[Advantage of the Invention] In the present invention, no measurement value of the adhesion rate of the yarn is displayed when the yarn sizing apparatus has just started its operation, and in an excessive state during the halting of the operation. Thanks thereto, no measurement value having a non-negligible error due to excessive state is displayed.

[0016] Further, no measurement value of the adhesion rate of the yarn is displayed when the measurement value of the adhesion rate of the yarn is a half or the sizing agent concentration or smaller, and when the value is twice or more of the concentration. Accordingly, no measurement value having a non-negligible error due to malfunction is displayed.

[0017] Therefore, with no measurement value having a

non-negligible error displayed, erroneous adjustment of the yarn sizing apparatus by the operator is successfully avoided.

[0018]

[Example] A yarn sizing apparatus in this example for executing a method to measure a sizing agent adhesion rate includes a beam creel section, a sizing section, a drying section, a dividing section, and a reel section, all of which are arranged in sequence.

[0019] The sizing section is, as shown in FIG. 1, provided with a main sink 1 for a sizing agent, and the main sink 1 is provided with a guiding roller 2, a sizing roller 3 which is half immersed in a sizing agent *s*, and a squeeze roller 4 structured by a roller half immersed in the sizing agent *s* and another roller arranged upstream thereof to be side by side. In such a structure, a yarn *y* coming from the guiding roller 2 goes into the sizing agent *s* beyond the sizing roller 3 in the main sink 1, and then goes through between the two rollers of the squeeze roller 4, thereby achieving sizing.

[0020] As shown in FIG. 1, the main sink 1 is formed with an overflow section 5 for keeping constant the surface height of the sizing agent. Lower to the overflow section 5 of the main sink 1, an auxiliary sink 6 is provided for the sizing agent, and a path 7 is so arranged as to receive the sizing agent *s* coming from the overflow section 5 of the main sink 1 and pass it to the auxiliary sink 6. A supply path 9 with a pump 8 is also provided for feeding the sizing agent *s* in the auxiliary

sink 6 to the main sink 1. With such a structure, the surface of the sizing agent in the auxiliary sink 6 falls as the sizing agent *s* in the main sink 1 adheres to the yarn *y* and thus becomes less in amount.

[0021] As shown in FIG. 1, the auxiliary sink 6 is provided with a surface lower limit gage 10 which produces an output when the surface of the sizing agent therein falls down to a lower limit position *a*, and a surface upper limit gage 11 which produces an output when the surface rises up to a predetermined upper limit position *b*.

[0022] As shown in FIG. 1, above the auxiliary sink 6, a storage sink 12 is placed for the sizing agent *s*. Therebetween, a feed path 14 with an opening and closing valve 13 is arranged for feeding the sizing agent *s* in the storage sink 12 to the auxiliary sink 6.

[0023] To the guiding roller 2 of the main sink 1, as shown in FIG. 1, a length measurement device 15 is provided for measuring the length of the yarn *y*.

[0024] Further, as shown in FIG. 1, a central processing unit 16 is provided. To an input end of the central processing unit 16, connected are the surface lower limit gage 10, the surface upper limit gage 11, and the length measurement device 15. Also connected are a low-speed operation switch 17, a high-speed operation switch 18, and an operation stop switch 19 of the yarn sizing apparatus, and an input device 20. To an output end of

the central processing unit 16, connected are the opening and closing valve 13 of the feed path 14, and a display unit 21.

[0025] For the duration between an output from the surface lower limit gage 10 and an output from the surface upper limit gage 11, the opening and closing valve 13 of the feed path 14 opens, and thus the sizing agent *s* in the storage sink 12 is supplied to the auxiliary sink 6.

[0026] In more detail, as shown in FIG. 2, every time the surface lower limit gage 10 produces an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 down to the lower limit position *a*, the opening and closing valve 13 of the feed path 14 opens. Then, once the sizing agent *s* clogged in the upstream of the opening and closing valve 13 of the feed path 14 starts flowing into the auxiliary sink 6 in the downstream of the opening and closing valve 13 of the feed path 14, the surface of the sizing agent in the auxiliary sink 6 stops falling and starts rising.

[0027] Further, as shown in FIG. 2, every time the surface upper limit gage 11 produces an output responding to the rising of the surface of the sizing agent in the auxiliary sink 6 up to the upper limit position *b*, the opening and closing valve 13 of the feed path 14 closes. The sizing agent *s* in the downstream of the opening and closing valve 13 of the feed path 14 responsively starts flowing into the auxiliary sink 6. Accordingly, the surface of the sizing agent in the auxiliary sink 6 rises above

the upper limit position *b*. Thereafter, when the amount of the sizing agent *s* flowing into the auxiliary sink 6 from downstream of the opening and closing valve 13 of the feed path 14 becomes less than the amount of the sizing agent *s* adhered to the yarn *y*, the surface of the sizing agent in the auxiliary sink 6 starts falling. Once the falling surface of the sizing agent in the auxiliary sink 6 reaches the upper limit position *b* or lower, the surface upper limit gage 11 stops producing an output.

[0028] In the method in this example for measuring the adhesion rate, as shown in FIG. 2, every time the surface upper limit gage 11 stops producing an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 reaching the upper limit position *b* or lower, the length measurement device 15 starts performing measurement. On the other hand, every time the surface lower limit gage 10 produces an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 down to the lower limit position *a*, the length measurement device 15 stops performing measurement.

[0029] That is, a measurement zone for the adhesion rate of the yarn *y* is so set as to be between the upper limit position *b* and the lower limit position *a*, through which the surface of the sizing agent in the auxiliary sink 6 falls. As to the amount of the sizing agent from the auxiliary sink 6 reducing while the surface of the sizing agent in the auxiliary sink 6 falls from the upper limit position *b* to the lower limit position *a*,

the value is calculated and input in advance from the input device 20 to the central processing unit 16.

[0030] Responding to every output from the surface lower limit gage 10, in the central processing unit 16, the adhesion rate of the yarn y is calculated. Used as the basis for the calculation are the length of the yarn y as a result of the measurement by the length measurement device 15, the amount of the sizing agent previously input from the input device 20, and the like. The resulting adhesion rate is output to the display unit 21 for display.

[0031] To start the operation of the yarn sizing apparatus which executes the method in this example for measuring the adhesion rate, a measurement start time T is first input from the input device 20 to a time unit in the central processing unit 16, the low-speed operation switch 17 is activated, and then the high-speed operation switch 18.

[0032] In response thereto, the time unit in the central processing unit 16 is activated, and also the sizing roller 3 and the squeeze roller 4 both start rotation. This agitates the sizing agent s in the main sink 1, and the agent adheres around the sizing roller 3 and the squeeze roller 4 both half immersed in the sizing agent s . Then, as shown in FIG. 2, the surface of the sizing agent in the auxiliary sink 6 rapidly falls for a predetermined period k . After the operation speed of the yarn sizing apparatus reaches the predetermined high-speed

operation speed, and after the moving speed of the surface of the sizing agent in the auxiliary sink 6 is not in the excessive state k any more, the measurement start time T elapses, and then the time unit of the central processing unit 16 produces an output.

[0033] After the time unit in the central processing unit 16 produces an output, when the falling surface of the sizing agent in the auxiliary sink 6 located at the start point b in the measurement zone reaches the end point a or lower, the length measurement device 15 is activated. Then, the adhesion rate of the yarn y is measured and displayed on the display unit 21. Before the output from the time unit in the central processing unit 16, the adhesion rate is not measured nor displayed.

[0034] To stop the high-speed operation of the yarn sizing apparatus or change the operation to the low-speed operation, the operation stop switch 19 or the low-speed operation switch 17 is activated.

[0035] In response, the sizing roller 3 and the squeeze roller 4 both start reducing in rotation speed, and thus the sizing agent s being agitated around these rollers 3 and 4 start flowing into the main sink 1, rapidly rising the surface of the sizing agent in the auxiliary sink 6. Here, if the operation stop switch 19 or the low-speed operation switch 17 is activated during the high-speed operation of the yarn sizing apparatus, this stops measurement and display of the adhesion rate thereafter. In a case where the length measurement device 15 is in operation

when the operation stop switch 19 or the low-speed operation switch 17 is activated, the length measurement device 15 stops its operation, and cancels the length so far measured.

[0036] Similarly, during the high-speed operation of the yarn sizing apparatus, in the central processing unit 16, every time the adhesion rate of the yarn y is calculated, the resulting measurement value is compared with the concentration of the sizing agent previously provided from the input device 20. If the calculated value is larger than a half of the concentration of the sizing agent, or smaller than a value twice the concentration, the value is displayed on the display unit 21. If the value is equal to or smaller than a half of the concentration of the sizing agent, or equal to or larger than the value twice the concentration, no measurement value is displayed on the display unit 21.

[0037] In this example, when the yarn sizing apparatus has just started its high-speed operation, and in an excessive state during the halting of the high-speed operation, no adhesion rate of the yarn is measured. Thanks thereto, no measurement value having a non-negligible error due to excessive state is displayed.

[0038] Further, when the measurement value of the adhesion rate of the yarn is a half of the sizing agent concentration or smaller, and when the value is twice or more of the concentration, no measurement value of the adhesion rate of the yarn is output.

Accordingly, no measurement value having a non-negligible error due to malfunction is displayed.

[Brief Description of the Drawings]

[FIG. 1] A schematic side view of a sizing section in a yarn sizing apparatus executing a method for measuring a sizing agent adhesion rate in an example of the present invention.

[FIG. 2] A diagram showing, in the method for measuring the sizing agent adhesion rate in the same example, an interrelation among an operation speed of the yarn sizing apparatus, a surface height of the sizing agent in an auxiliary sink, an output of a surface upper limit gage, an output of a surface lower limit gage, and ON/Off of a length measurement device, and their changes over time.

[Description of Reference Numerals and Signs]

- 1 main sink
- 6 auxiliary sink
- 15 length measurement device
- 16 central processing unit
- a lower limit position, end point of measurement zone
- b upper limit position, start point of measurement zone
- s sizing agent
- y yarn

TRANSLATION WITHIN FIG. 2

(From Above in Order)

HIGH-SPEED

OPERATION SPEED OF YARN SIZING APPARATUS

LOW-SPEED

STOP

SURFACE HEIGHT OF SIZING AGENT IN AUXILIARY SINK 6

OUTPUT FROM SURFACE UPPER LIMIT GAGE 11

OUTPUT FROM SURFACE LOWER LIMIT GAGE 10

ON/OFF OF LENGTH MEASUREMENT DEVICE 15

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